Work Order ID 85369

85369

June-07-12 9:17:51 AM

Item ID: D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*
Revision ID: **Stop** *NS2*
Item Name: Crosstube Aft

Start Date: 07/06/2012 **Start Qty:** 1.00 *1*
Required Date: 21/06/2012 **Req'd Qty:** 1.00 *1*
Reference:

Cust Item ID:
Customer:

Approvals: **Process Plan:** MLJ **Date:** 12/06/07 **Tooling:** **Date:** **Run Start** *NR1*
QC: **Date:** **SPC (Y/N):** **Date:** **Stop** *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	**Revision Nbr**								
D412-664-243	E/DEO								
100	DOCUMENT CONTROL SP	0.00							
100									
DC	**Memo**	0.00							
Document Control	Photocopy bluefile and create labels as per PPP D412-664-203 CH01008								
110	Packaging	0.00							
110									
Packaging	**Memo**	0.00							
Packaging									
120	BENDING MACHINE - CROSSTUBES	0.00							
120									
CNC Bend 2	**Memo**	0.00							
CNC Alpha 160 Bender	Bend tube as per Dwg D412-664-243 using CNC bender program 412-aft and Folio FT010								

DA 16 12/13/16

for MLJ 12-7-16

JW 12-6-12

PTO

JW/Rm 12-6-12

Dart Aerospace Ltd

W/O: 85369	WORK ORDER CHANGES						
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: D412-664-203 **PAR #:** _____ **Fault Category:** V-tube **NCR:** Yes (No) **DQA:** [signature] **Date:** 12/07/13

Resolution: _____ **Disposition:** use as is **QA: N/C Closed:** [signature] **Date:** 12/7/20

NCR: 12-1596	WORK ORDER NON-CONFORMANCE (NCR)							
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B — **Initial** Chief Eng	**Action Description** Chief Eng	**Sign & Date**	**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
12/6/13	120	~~Bending~~ Crushing is over tolerance after bending	GP 12/6/13	Acceptable per attached SR	N/A	DAS 16 2.89 12/6/13	GP 12/6/13 QS1042	DAS 16 2.89 12/6/13

NOTE: Date & initial all entries

Work Order ID 85369

85369

June-07-12 9:17:51 AM

Item ID: D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*

Revision ID: **Stop** *NS2*

Item Name: Crosstube Aft

Start Date: 07/06/2012 **Start Qty:** 1.00 *1*

Required Date: 21/06/2012 **Req'd Qty:** 1.00 *1*

Reference:

Cust Item ID:

Customer:

Run Start *NR1*

Stop *NR2*

Approvals: **Process Plan:** **Date:** **Tooling:** **Date:**

QC: **Date:** **SPC (Y/N):** **Date:**

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130	QC15- Crosstube Dimensional Check	0.00							
130		8/7/2013							
QC	**Memo**	0.00							
Quality Control									
140		0.00							
140	Crosstubes								
Crosstubes	**Memo**	0.00							
Crosstubes	1-Drill pilot holes in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551and drill table DT8577 using #9 holes as per QSI 10 to install towers.								
	2-Ream hole to finish size in tube as per Dwg D412-664-243using drill Jig DT8550 & DT8551.Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes.								
	3-SCRIBE PART # & BATCH #								
	4-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243								

MO 12-6-18

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Work Order ID 85369

June-07-12 9:17:51 AM

85369

Item ID: D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*

Revision ID: **Stop** *NS2*

Item Name: Crosstube Aft

Start Date: 07/06/2012 **Start Qty:** 1.00 *1*

Required Date: 21/06/2012 **Req'd Qty:** 1.00 *1*

Reference:

Cust Item ID:

Customer:

Run Start *NR1*

Stop *NR2*

Approvals: **Process Plan:** **Date:** **Tooling:** **Date:**

QC: **Date:** **SPC (Y/N):** **Date:**

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150	Crosstubes Chemical Conversion	0.00							
150									Pb →
HandFXtube	**Memo**	0.00							
Hand Finishing Crosstubes									
160	QC3- Inspect Part Finish	0.00							
160									Pb →
QC	**Memo**	0.00							
Quality Control									
170	QC5- Inspect part completeness to step on W/O	0.00							
170		Sidelle							
QC	**Memo**	0.00							
Quality Control									

Dart Aerospace Ltd

W/O: 85369 Prom. Move

WORK ORDER CHANGES

DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
12/06/18	# 150/160	move steps # 150 + 160 to after step # 200 Due to corrosion issue.					12/06/18

Part No: D412-664-203 **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

WORK ORDER NON-CONFORMANCE (NCR)

NCR:

DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 85369

85369

June-07-12 9:17:51 AM

Item ID: D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*

Revision ID: **Stop** *NS2*

Item Name: Crosstube Aft

Start Date: 07/06/2012 **Start Qty:** 1.00 *1*

Required Date: 21/06/2012 **Req'd Qty:** 1.00 *1*

Reference:

Cust Item ID:

Customer:

Run Start *NR1*

Stop *NR2*

Approvals: **Process Plan:** **Date:** **Tooling:** **Date:**

QC: **Date:** **SPC (Y/N):** **Date:**

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
180	Outsource process - NDT per QSI038 4.1	0.00							
180									
Outsource2	**Memo**	0.00							
Outsource process - NDT	Liquid Penetrant Inspection as per QSI 038Or Issue P/O: 17258 LPI as per ASTM 1417 Level 2 Attach copy of NDT results to work order								
190		0.00							
190	Packaging								
Packaging	**Memo**	0.00							
Packaging	Inspect for transit damage Ensure copy of NDT results attached to work order.								
200	QC5- Inspect part completeness to step on W/O	0.00							
200									
QC	**Memo**	0.00							
Quality Control	Inspect for damage & ensure results are as per Dwg D412-664-203								

CL 12/06/19

12/6/19

12 06 19

* chemical coat as per QSI 005 inside + out

* QC7 inspect chemical coat.

12-6-26

12/06/26

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Item ID: D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*
Revision ID: **Stop** *NS2*
Item Name: Crosstube Aft

Start Date: 07/06/2012 **Start Qty:** 1.00 *1*
Required Date: 21/06/2012 **Req'd Qty:** 1.00 *1*
Reference:

Cust Item ID:
Customer:

Run Start *NR1*
Stop *NR2*

Approvals: **Process Plan:** **Date:** **Tooling:** **Date:**
QC: **Date:** **SPC (Y/N):** **Date:**

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210		0.00							
210	SprayPaint					AB	12-7-14		
SprayPaint	**Memo**	0.00							
Spray Painting	***Mask underside of crosstube as shown*** 1-Prime inside and outside crosstube as per QSI 005 4.2 2-Paint outside crosstube with White Imron as per DEO D412-664-243 and QSI 005 4.2 PRIME: Start Time: 10:00 Fininsh Time: 11:20 > WL 12.07.10 (1) PAINT: 122381 Start Time: 12:45 Finish Time: 1:30 > AB 12-7-14								
220	QC14- Inspect Spray Paint	0.00							
220									
QC	**Memo**	0.00							
Quality Control	Then,Wrap in plastic bag to protect from scratches								

DAS 16 8-8 rlw 12/8/10

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Work Order ID 85369

June-07-12 9:17:51 AM

85369

Item ID: D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*

Revision ID: **Stop** *NS2*

Item Name: Crosstube Aft

Start Date: 07/06/2012 **Start Qty:** 1.00 *1*

Required Date: 21/06/2012 **Req'd Qty:** 1.00 *1*

Reference:

Cust Item ID:

Customer:

Approvals: **Process Plan:** **Date:** **Tooling:** **Date:**

QC: **Date:** **SPC (Y/N):** **Date:**

Run Start *NR1*

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
230		0.00							
230	Crosstubes					AP	12-7-15		
Crosstubes	**Memo**	0.00							
Crosstubes	Assemble as per Dwg D412-664-203								
	1- Install chafing shield as per DEO D412-664-243.Top holes should be facing up. A/R Proseal 890 Batch: 121287 EXP: 11/12								
	2- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe								
	3-Install support with Scotch-Weld DP460 and install clamps as per DEO Dwg D12-664-243 using installaition jig DT9024. Torque clamps as per dwg A/R Scotch-Weld DP460 Batch: 121368 EXP: 13-4-13								
240	QC5- Inspect part completeness to step on W/O	0.00							
240						DAS 16 9-8	12/07/16		
QC	**Memo**	0.00							
Quality Control									

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Work Order ID 85369

85369

June-07-12 9:17:51 AM

Item ID: D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*

Revision ID: **Stop** *NS2*

Item Name: Crosstube Aft

Start Date: 07/06/2012 **Start Qty:** 1.00 *1* **Cust Item ID:**

Required Date: 21/06/2012 **Req'd Qty:** 1.00 *1* **Customer:**

Reference:

Run Start *NR1*

Stop *NR2*

Approvals: **Process Plan:** **Date:** **Tooling:** **Date:**

QC: **Date:** **SPC (Y/N):** **Date:**

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
250	Pick Kit	0.00							12/7/16 SP
250									
Packaging	**Memo**	0.00							
Packaging									
260	QC4- 100% Inspect kits for completeness	0.00 DAS 16 12-09 12/8/16							
260									
QC	**Memo**	0.00							
Quality Control									
270		0.00							12/7/16
270	Packaging								
Packaging	**Memo**	0.00							
Packaging	Identify and pack for shipping as per PPP D412-664-203 ******Ensure tube is not packaged if curing time is less than 12 hrs, see step 27 for application time & date ******* Time & date of packaging: Rev J Location: 103								

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Work Order ID 85369

June-07-12 9:17:51 AM

85369

Item ID: D412-664-203 **Accept** *N900040100* **Setup Start** *NS1*

Revision ID: **Stop** *NS2*

Item Name: Crosstube Aft

Start Date: 07/06/2012 **Start Qty:** 1.00 *1*

Required Date: 21/06/2012 **Req'd Qty:** 1.00 *1*

Reference:

Cust Item ID:

Customer:

Approvals: **Process Plan:** **Date:** **Tooling:** **Date:** **Run Start** *NR1*

QC: **Date:** **SPC (Y/N):** **Date:** **Stop** *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
280	QC21- Final Inspection - Work Order Release	0.00							
280									
QC	**Memo**	0.00							
Quality Control									

12/7/17

MF 12-07-16

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

June-07-12 9:17:55 AM

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Work Order ID: 85369

85369

Parent Item: D412-664-203

D412-664-203

Parent Item Name: Crosstube Aft

Start Date: 07/06/2012 **Required Date:** 21/06/2012

Start Qty: 1.00 **Required Qty:** 1.00

Comments:
IPP Rev:E04.02.16Reformat; Added D3189-1K/DS
IPP Rev:F 06-03-29 Remove Coments on Pick List JLM
IPP Rev:G 06.12.08 per ECN 886 EC
IPP Rev:H 07-04-30 As per Rev D JLM
IPP Rev:I 08-06-12 add comment in seq. 21 DD verified by:EC IPP rev J
11.04.21 DEO D412-664-243-E-1 EC verified DD IPP REV:K
11.10.03 DEO D412-664-243-E-2 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D412-664-203TRN		Manufactured	No			110	Each	2.0000	1	1			
D412-664-203TRN									**				
Crosstube Turning Detail													

Location	Loc Qty	Loc Code
LG	2	
83807	1	
83808	1	

D2896-1		Manufactured	No			230	Each	22.0000	1	1			
D2896-1									**				
Support													

71502 / 74465

Location	Loc Qty	Loc Code
LG052	8	
80586	8	
LG053	14	
74465	14	

D3189-1		Manufactured	No			230	Each	16.0000	2	2			
D3189-1									**				
Chafing Shield													

Location	Loc Qty	Loc Code
FG	4	
36065	4	
LG053	12	
83972	12	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

June-07-12 9:17:55 AM

Work Order ID: 85369

85369

Parent Item: D412-664-203

D412-664-203

Parent Item Name: Crosstube Aft

Start Date: 07/06/2012 **Required Date:** 21/06/2012

Start Qty: 1.00 **Required Qty:** 1.00

D3595-063-570	Manufactured	No		230	Each	153.0000	2	2

D3595-063-570

RUBBER CUSHION

**

AB 12-7-15

Location	Loc Qty	Loc Code	
FG	8		
37971	1		
42243	7		
LG	78		
83294	78		
MAT052	67		
71534	1		
76546	66		②

MS21920-28	Purchased	No		230	Each	71.0000	4	4

MS21920-28

Clamp(per MIL-DTL-8783C)

122204

**

AB 12-7-15

④

Location	Loc Qty	Loc Code	
FG	5		
105884	5		
LG050	50		
116839	2		
118713	4		
120054	2		
121067	42		
LG051	16		
121440	16		

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

June-07-12 9:17:55 AM

Work Order ID: 85369

85369

Parent Item: D412-664-203

D412-664-203

Parent Item Name: Crosstube Aft

Start Date: 07/06/2012 **Required Date:** 21/06/2012

Start Qty: 1.00 **Required Qty:** 1.00

MS21920-30		Purchased	No		230	Each	101.0000	2	2

MS21920-30

clamp(per MIL-DTL-8783C)

**

AB 12-7-15

Location	Loc Qty	Loc Code	
LG	38		
119529	38		(2)
LG051	63		
111258	14		
121583	49		

AN6-40A		Purchased	No		250	Each	156.0000	[redacted]	4

AN6-40A

Bolt

**

sl

Location	Loc Qty	Loc Code	
ST342	156		
120187	66		
120833	4		
121349	11		
121584	25		
121827	50		4

AN6-41A		Purchased	No		250	Each	81.0000	[redacted]	2

AN6-41A

Bolt

**

sl

Location	Loc Qty	Loc Code	
ST342	81		
119749	1		
120423	50		2
121825	30		

AN960JD616	NAS1149D0663J	Purchased	No		250	Each	0.0000	[redacted]	18

AN960JD616

Washer

**

M12444 12/2/1650

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

Picklist Print

June-07-12 9:17:55 AM

Work Order ID: 85369

85369

Parent Item: D412-664-203

D412-664-203

Parent Item Name: Crosstube Aft

Start Date: 07/06/2012 **Required Date:** 21/06/2012

Start Qty: 1.00 **Required Qty:** 1.00

MS21042L6	Purchased	No		250	Each	648.0000	6 **	6

MS21042L6

Nut

12/7/16 JP

Location	Loc Qty	Loc Code
ST300	648	
117677	25	
118384	3	
118927	48	
119075	372	
120308	200	

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Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	**STEP**	**PROCEDURE CHANGE**	**By**	**Date**	**Qty**	**Approval** Chief Eng / Prod Mgr	**Approval** QC Inspector

Part No: _____ **PAR #:** _____ **Fault Category:** _____ **NCR:** Yes No **DQA:** _____ **Date:** _____

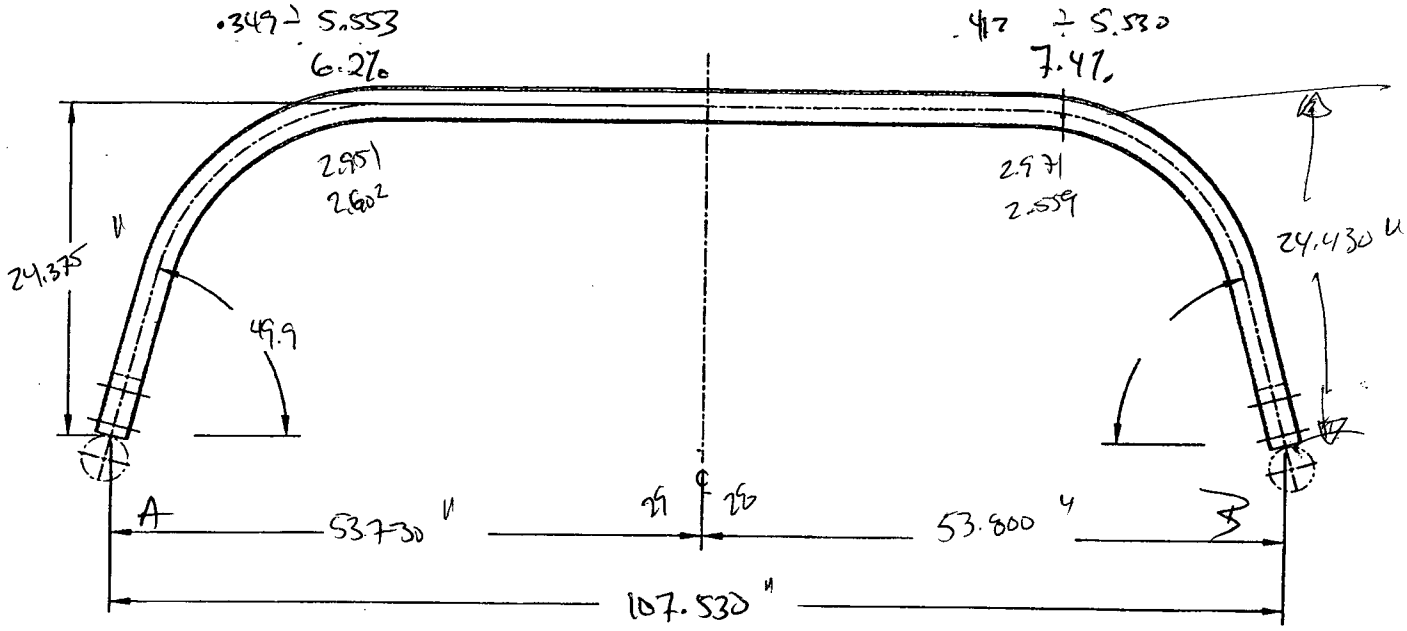
Resolution: _____ **Disposition:** _____ **QA: N/C Closed:** _____ **Date:** _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	**STEP**	**Description of NC** Section A	**Corrective Action** Section B			**Verification** Section C	**Approval** Chief Eng	**Approval** QC Inspector
			Initial Chief Eng	**Action Description** Chief Eng	**Sign & Date**			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	5369
Description: Crosstube High Aft (412)	Part Number:	D412-664-203
Inspection Dwg: D412-664-243 **Rev:** E		Page 1 of 1

Required Dimension	Min	Max
Height	24.24	24.50
1/2 Span	53.59	53.85
Angle	49	52
Total Span	107.18	107.70



Comments
Side A: 6.2% crushing @ 29 passes
Side B: 7.4% crushing @ 28 passes
Acceptable QC 12/6/13

QC15 Inspection	
Date	12/6/13

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	07.05.08	Dimensions updated per Dwg rev. D	KJ/JLM	
C	10.02.02	Dwg Rev updated	KJ	

Item	Qty -243	Part Number	Description
1	X	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
2	1	D6009-129	CROSSTUBE
3	2	D3595-063-570	RUBBER CUSHION
4	1	D2896-1	SUPPORT
5	2	D3189-1	CHAFING SHIELD
6	2	D2856-600-1009	ABRASION STRIP
7	4	MS21920-28	CLAMP
8	2	MS21920-30	CLAMP (OR MS21920-32)
9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

GENERAL NOTES:

1) MATERIAL: MANUFACTURED FROM D6009-129
   FINISHED LENGTH = 124.100±0.020 (BEFORE BENDING/TRIMMING)
2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
   PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
   PAINT OUTSIDE PER DART QSI 005 4.2
3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
4) UNITS: INCHES UNLESS OTHERWISE NOTED.
5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
6) IDENTIFICATION: SCRIBE DART PART NUMBER "D412-664-243" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
7) WEIGHT: 47.0 lbs (PER IIN-D212-664)
8) PART IS SYMMETRIC ABOUT CENTERLINE.
9) RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALY, TRANSITION SHOULD BE SMOOTH.
10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
13) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE THE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
14) INSTALL D2856-600-1009 ABRASION STRIPS WITH A 0.13 REF GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
15) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 85365 MLJ
12/06/07

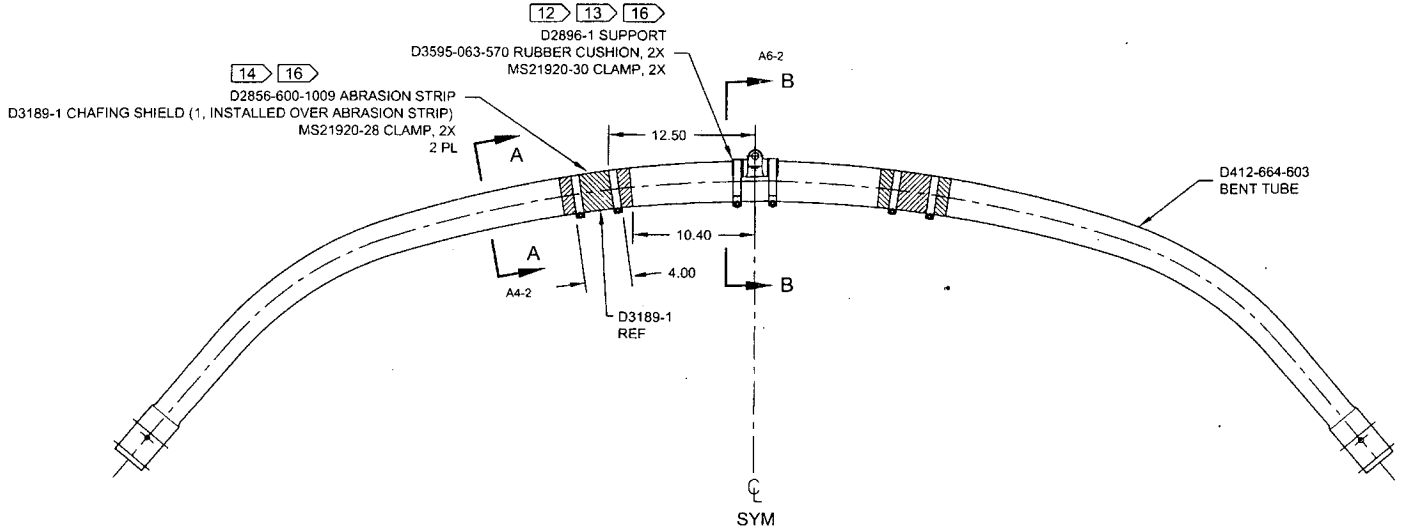
② DEO ATTACHED

RELEASED
2009 -10- 29

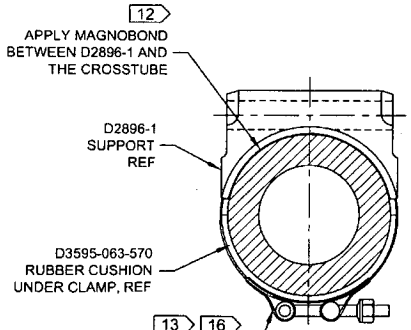
REV.	DESCRIPTION	BY	DATE
E	REFORMAT/REVISE GENERAL NOTES; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A5-3); ADD TOLERANCE (ZN B6-3, C4-3, C8-3 & C5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	09.09.30
D	REMOVE D2732-058, CHANGE TO D3595-063-570	PH	07.03.09
C	REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398, MS21920-32 WAS MS21920-30	MB	06.10.27
B	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	PH	05.02.04
A	NEW ISSUE	PH	01.10.17

DESIGN	PH	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED		DRAWING NO.	REV. E
MFG. APPR.		D412-664-243	SHEET 1 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
DATE	09.09.30		

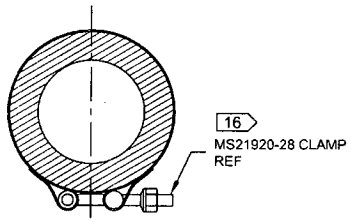
g5369



D212-664-243
ASSEMBLY DETAIL E



SECTION B-B D4-2
SCALE 4X



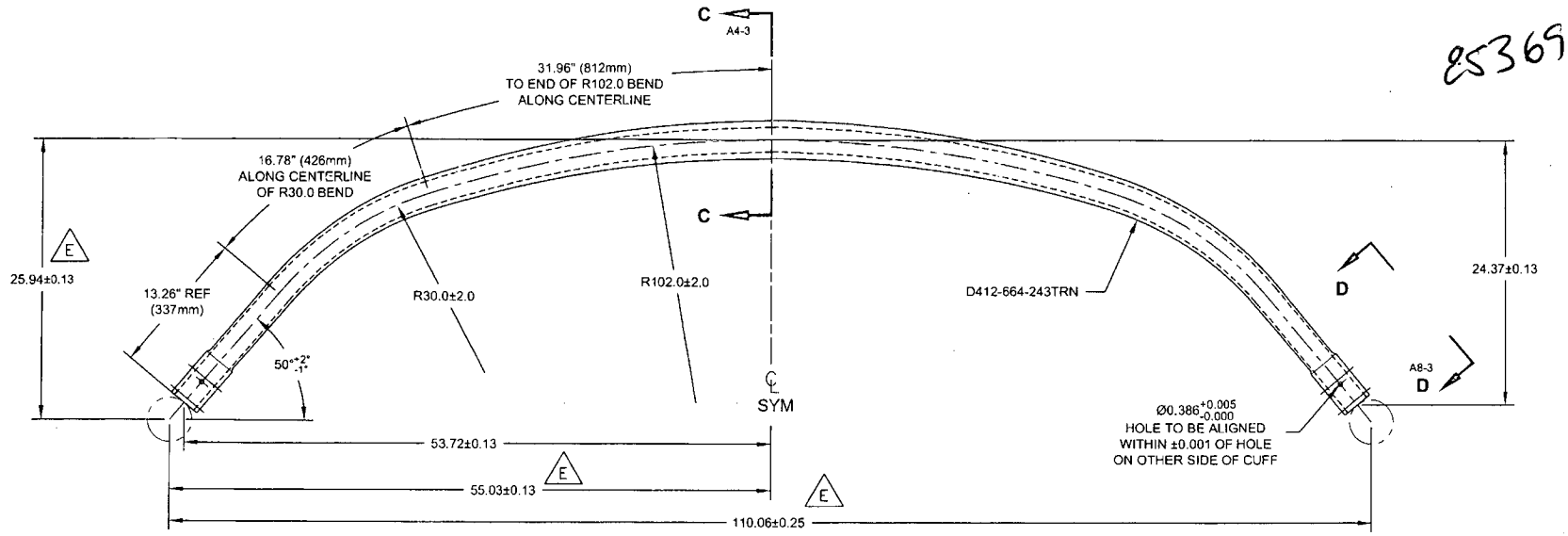
SECTION A-A C6-2
SCALE 4X

(2) DEO 15 ATTACHED

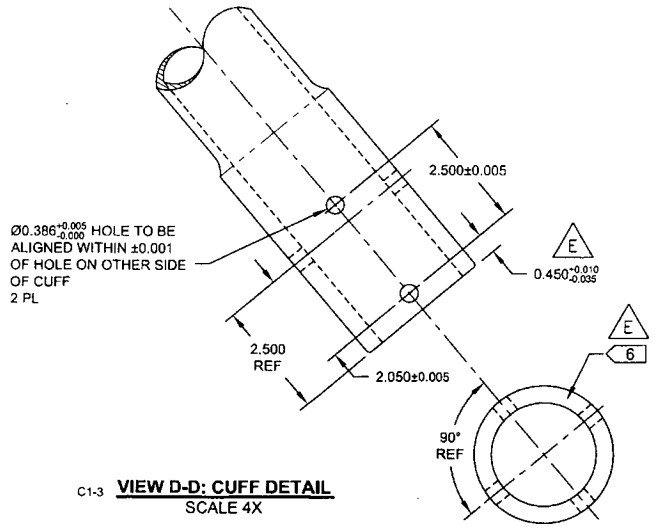
RELEASED
2009 -10- 28

DESIGN	PH	**DART AEROSPACE LTD**	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. E
MFG. APPR.		D412-664-243	SHEET 2 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
DATE	09.09.30		

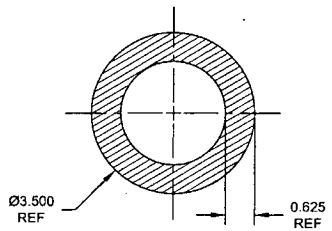
85369



D412-664-603 10
BENDING AND DRILLING DETAIL E



C1-3 **VIEW D-D: CUFF DETAIL**
SCALE 4X

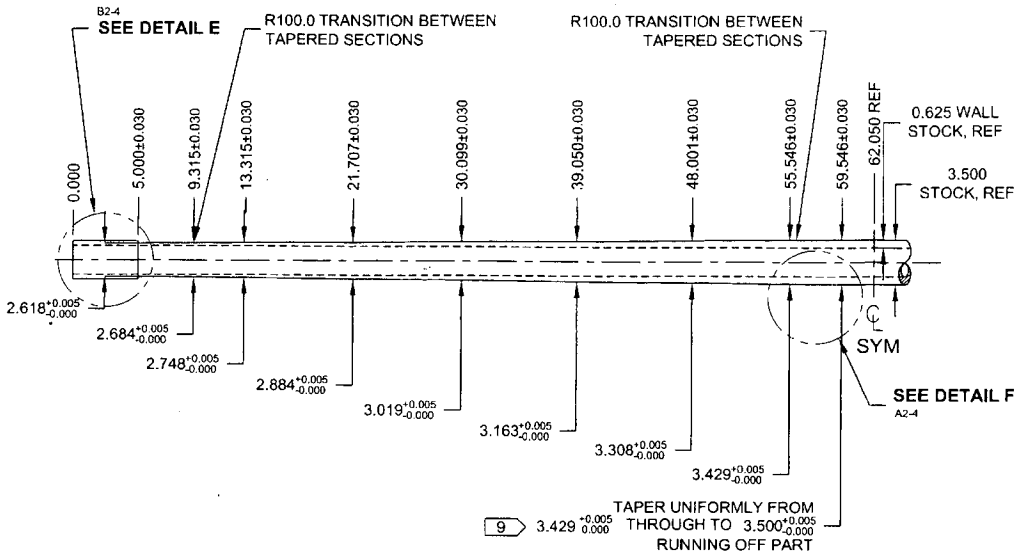


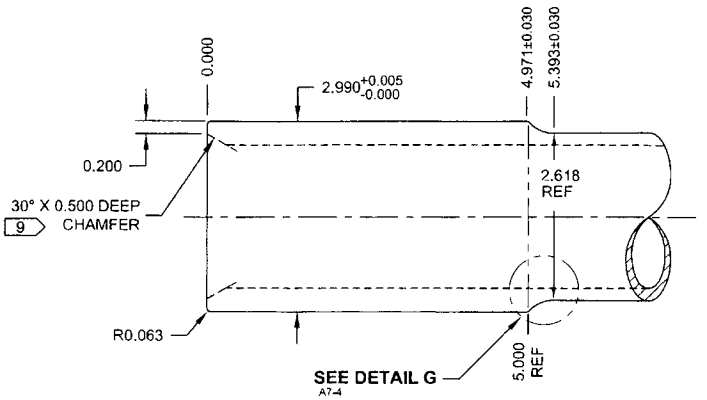
SECTION C-C D5-3
SCALE 4X

② DEO ATTACHED

RELEASED
2009 -10- 29

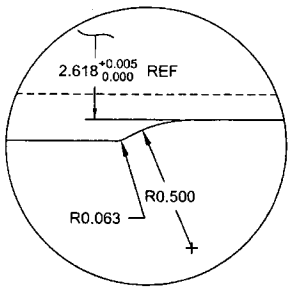
DESIGN	PH	**DART AEROSPACE LTD**	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. E
MFG. APPR.		D412-664-243	SHEET 3 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
DATE	09.09.30		



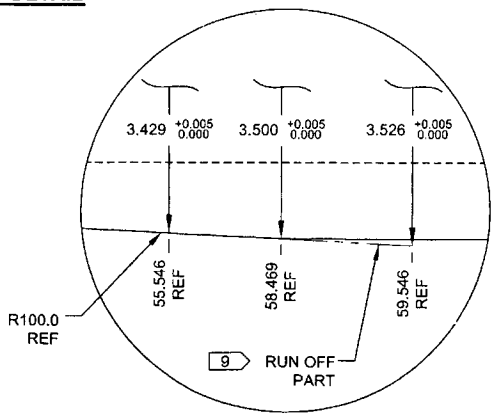


DETAIL E:
CROSSTUBE CUFF D8-4
SCALE 5X

D412-664-243TRN
TURNING DETAIL E



DETAIL G:
CUFF TRANSITION C2-4
SCALE 10X



DETAIL F:
TAPER RUN-OFF C4-4
NOT TO SCALE

2 DEO'S ATTACHED

RELEASED
2009 -10- 29

DESIGN	PH	**DART AEROSPACE LTD**	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. E
MFG. APPR.		D412-664-243	SHEET 4 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE ASSEMBLY (412 HI AFT)	NTS
DATE	09.09.30		

DRAWING NO.	TITLE	REV. E	DART AEROSPACE LTD ENGINEERING ORDER	D.E.O. NO.	SHEET NO.	SCALE
D412-664-243	CROSSTUBE ASSEMBLY (412 HI AFT)			D412-664-243-E-1	SHEET 2 OF 2	NTS

DRAWN	CHECKED	MFG. APPR.	APPROVED	DE APPR.
DATE 11.03.31	DATE 11.03.31	DATE 11.03.31	DATE 11.03.31	DATE 11.03.31

95369

IS:

<16> <14>
D3189-1 CHAFING SHIELD (1, INSTALLED OVER PROSEAL 890)
MS21920-28 CLAMP, 2X
2 PL

D412-664-603
BENT TUBE

2.00
1.00

WAS:

<14> <16>
D2856-600-1009 ABRASION STRIP
D3189-1 CHAFING SHIELD (1, INSTALLED OVER ABRASION STRIP)
MS21920-28 CLAMP, 2X
2 PL

D3189-1
REF

D412-664-243
ASSEMBLY DETAIL

RELEASED
2011-04-07

<2>
MASK AREA PRIOR TO PAINTING AND
APPLY CLEAR COAT AFTER PAINTING

2.00

℄
SYM

DRAWING NO.	TITLE	REV. E	DART AEROSPACE LTD	D.E.O. NO.	SHEET NO.	SCALE
D412-664-243	CROSSTUBE ASS'Y (412 HI AFT)		ENGINEERING ORDER	D412-664-243-E-2	SHEET 1 OF 1	NTS

DRAWN	CHECKED	MFG. APPR.	APPROVED	DE APPR.
	AJS			
DATE 11.09.07	DATE 11.09.19	DATE 11.09.19	DATE 11.09.19	DATE 11.09.19

85369

PURPOSE:
REPLACE MAGNOBOND WITH 3M DP460 SCOTCH-WELD EPOXY ADHESIVE

CHANGE:

IS:

Item	Qty -243	Part Number	Description
9	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD

WAS:

9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

NOTE 12 & 16, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

12) INSTALL D2896-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015. LET CURE FOR 24 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.

16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVE HAS CURED FOR 24 HOURS.**

WAS:

12) INSTALL D2896-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.

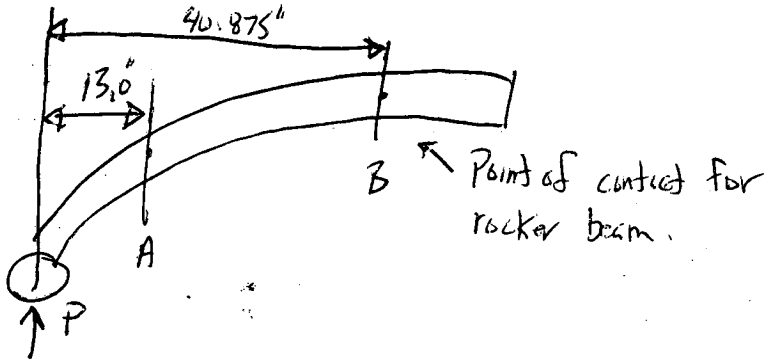
16) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

RELEASED
2011-09-29

11.12.06

CRUSHING OF D412-664-243

Acceptability of 8% CRUSHING AT END OF BEND



POINT A: $OD_1 = 2.961"$, $OD_2 = 2.522"$

CRUSHING = $(2.961-2.522)/(2.961+2.522) = 8\%$

$I = 1.676\ in^4$ (from AutoCAD)

POINT B: $OD_1 = 3.307"$, $I = 4.613\ in^4$

A: $F = Mc/I = P \times 13 \times 2.961 / 2 \times 1.676 = 11.484 \cdot P$

B: $F = P \times 40.875 \times 3.307 / 2 \times 4.613 = 14.651 \cdot P$

$M.S. = 14.651/11.484 - 1 = 0.27$

∴ Tube will break at rocker beam contact before area of 8% crushing; 8% crushing in area at end of tube bend is acceptable

11.12.06

ACUREN

LIQUID PENETRANT TEST REPORT

P- 12185

PAGE 1 OF 1

CLIENT	DAT AEROSPACE	DATE	06/19/2012 TIME AM ☑ PM ☐
ATTENTION	MATT/LINDA	ACUREN JOB NO.	188-12-C0265
ADDRESS	1270 ABERDEEN ST. HAWKESBURY ON.	PO/WO NO.	17258 —
		WORK LOCATION	SAME
		ACCEPTANCE STD	ASTM 1417/SI-038 REV./DATE 2005
PROJECT	F.P.I. ON CROSS TUBES.		
ITEM(S) EXAMINED	SEE RESULTS		

ITEM DESCRIPTION		PROCEDURE NO. LT-002 REV./DATE	2008	TECHNIQUE NO. LT-GH-2 REV./DATE	2008
PART NO	CROSS TUBES - SEE RESULTS	MATERIAL	ALUMINUM	THICKNESS	VARIOUS
TYPE	WET FLUORESCENT LIQUID PENETRANT INSPECTION WAS CARRIED OUT ON THE 100% EXTERNAL SURFACE.				

TEST DETAILS

METHOD	☑ FLUORESCENT ☐ VISIBLE			☑ WATER WASH	☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED
FAMILY BRAND	MAGNAFLUX			BLACK LIGHT S/N 16459	☑ OUTPUT > 1000 μW/CM² ☐ AMBIENT < 2 fc
PENETRANT	ZL67	MINIMUM DWELL TIME	45/10 MIN.	LIGHTING EQUIP.	☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT>100 fc @ SURFACE
PENETRANT REMOVER	470	MINIMUM DRY TIME	>10 MIN.	OTHER	LABINO
DEVELOPER	SKD S2	MINIMUM DWELL TIME	10 MIN.	LIGHT METER S/N	1098866 CAL DUE DATE Jun 19 2012
DEVELOPER TYPE	☑ NON AQUEOUS ☐ AQUEOUS	☐ DRY			

TEST SURFACE

SURFACE CONDITION	☐ AS GROUND	☐ AS WELDED	☑ MACHINED	☐ SHOT BLASTED	☑ CLEAN BARE METAL
SURFACE TEMPERATURE	☐ < -4°C/ 20°F	☐ -4°C/ 20°F TO 10°C/50°F		☑ 10°C/50°F TO 52°C/125°F	☐ > 52°C/125°F

RESULTS- (☐ METRIC ☐ IMPERIAL)

CROSS TUBES

QTY		S.O.#	
1	"	85369	✓
2	"	85371	✓
1	"	85370	✓
1		85368	✓

- RECLAND - 1 TIME

M/ 12:06 19

Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc's liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, express or implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE (PRINT & SIGNATURE)	Matthew Murdoch (PRINT)	Matthew Murdoch (SIGNATURE)	DTR # [redacted]
NAME (PRINT)	Mike Lithgow		REPORT REVIEWED BY: E-6570
	1ST TECHNICIAN	2ND TECHNICIAN	NAME INITIALS
	CGSB LEVEL II SNT LEVEL ____	CGSB LEVEL ____ SNT LEVEL ____	
	CGSB REG. NO 6606	CGSB REG. NO ____	

WHITE – CLIENT COPY CANARY – OFFICE COPY PINK – TECHNICIAN COPY GOLD – OFFICE COPY

5.0 PARTS LIST

5.1 HIGH GEAR CROSSTUBES

Item	-101	-201	-203	Part Number	Description
	X			D212-664-101	**CROSSTUBE INSTALLATION, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH FWD**
		X		D212-664-201	**CROSSTUBE INSTALLATION, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH AFT**
			X	D412-664-203	**CROSSTUBE INSTALLATION, 412 HIGH AFT**
1	1			D212-664-141	CROSSTUBE ASSEMBLY, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH FWD
2		1		D212-664-241	CROSSTUBE ASSEMBLY, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH AFT
3			1	D412-664-243	CROSSTUBE ASSEMBLY, 412 HIGH AFT
10	2			* D2893-1	SUPPORT
11	4			* D3595-063-450	RUBBER CUSHION
12	4			* MS21920-25	CLAMP (OR MS21042-26)
13	4			AN6-35A	BOLT
14	4			AN6-36A	BOLT
15	6			MS21042L6	NUT (OR MS21042-6)
16	18			AN960JD616	WASHER
20		2		* D2940-1	SUPPORT
21		4		* D3595-063-530	RUBBER CUSHION
22		4		* MS21920-28	CLAMP (OR MS21042-30)
23		4		AN6-40A	BOLT
24		2		AN6-41A	BOLT
25		6		MS21042L6	NUT (OR MS21042-6)
26		18		AN960JD616	WASHER
30			1	* D2896-1	SUPPORT
32			2	* D3595-063-570	RUBBER CUSHION
33			4	* MS21920-28	CLAMP
34			2	* MS21920-30	CLAMP (OR MS21042-32)
35			4	AN6-40A	BOLT
36			2	AN6-41A	BOLT
37			6	MS21042L6	NUT (OR MS21042-6)
38			18	AN960JD616	WASHER
39			2	* D3189-1	CHAFING SHIELD
50	1	1		D3428-1	PLACARD

*REFERENCE ONLY. PARTS ARE INCLUDED IN D212-664-141/-241 OR D412-664-243 ASSEMBLIES ABOVE
NOTE: KITS INCLUDE EXTRA HARDWARE FOR COMPATIBILITY WITH BOTH DART AND BELL/AAI SKIDTUBES.